PALLET LOADING APPARATUS

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a pallet loading apparatus, and more specifically to an apparatus for loading a pallet carried by one conveyor with articles or containers transferred from another conveyor.

[0002] Pallets are extensively used within processing plants to transfer work in process between work stations. In addition, pallets are the mode of choice for conveying raw materials and finished products from one location to another.

[0003] In its most rudimentary form, palletizing of articles to be conveyed is accomplished by manual labor – i.e., a human operator manually places an article or articles on a pallet. Of course, manual palletizing is limited by the speed and mobility of the human operator.

[0004] Automatic palletizing or stacking of articles on pallets has been around for quite awhile. In an optimum scenario, articles to be stacked and shipped by pallet are transported by conveyor from a finishing station. A second conveyor is provided for discharge of pallets carrying articles stacked thereon. In such an installation, the pallet themselves are fed from a separate supply.

[0005] Such a configuration is depicted generally in **FIG. 1**. Specifically, a series of articles **A** are conveyed by a conveyor $\mathbf{C_1}$ to a transfer apparatus **T**. A second conveyor $\mathbf{C_2}$ transports a

pallet **P** situated thereon. In one typical installation, a series of rollers **R** disposed within the second conveyor C_2 are aligned with a discharge end of the first conveyor C_1. The transfer apparatus **T** transports the article **A** onto a pallet **P** when it is situated on the rollers **R**.

[0006] In a typical installation, the article **A** is conveyed onto the transfer apparatus **T** by the first conveyor C_1. The transfer apparatus **T** includes a pusher component that pushes the article onto an awaiting pallet. Once the article has been loaded, the second conveyor C_2 operates to carry the loaded pallet away.

[0007] One problem that must be overcome with an automatic palletizing system is the smooth transfer of the article **A** onto an awaiting pallet **P**. In many cases, this transfer can be accomplished by simply pushing the article **A** directly onto the pallet. However, certain articles, raw materials or products make this approach problematic. For instance, where the article **A** is a stack of sheet material, this approach is highly unsatisfactory. The lower-most sheets in this stack are prone to being destroyed as they are pushed onto the rough surface of the pallet. Moreover, if enough of the sheet material binds against the pallet, the transfer operation is comprised and can be interrupted.

[0008] In one typical prior approach, the stacked article is lifted while a pallet is directed underneath the elevated load. The article is then lowered onto the pallet and the pallet is discharged on an exit conveyor. The patent of Postigo, No. 4,764,074 is representative of pallet loading apparatus of this type. As

explained more fully in this patent, the stacked article is conveyed to a lifting station where a number of forks, interleaved between conveyor rollers, are slid beneath the stacked articles and used to lift the articles off the conveyor rollers. The pallet is then introduced onto the conveyor rollers directly beneath the elevated load supported by the forks. As the forks are retracted, the load settles onto the pallet for discharge.

[0009] One significant difficulty with this approach is that the stacked article or product must be conveyed to the transfer apparatus, lifted and then later dropped onto the pallet. After the load is mounted on the pallet, the lifting forks must be removed before the article and pallet can continue their travel along the discharge conveyor. This approach is much more time consuming than simply pushing the product onto a pallet that is momentarily stopped at a transfer apparatus.

[0010] Consequently, there remains a need for a pallet loading apparatus that is adapted to easily convey sheet material onto a pallet. This need encompasses the desire to make this transfer operation occur as quickly as possible to permit high-speed pallet loading.

SUMMARY OF THE INVENTION

[0011] In order to address these unresolved needs, the present invention contemplates an apparatus for loading or transferring an article from a first conveyor section onto a pallet situated on a second conveyor section. The apparatus includes a pusher mechanism for pushing the article from the first to the second conveyor section. An extension fork assembly is interposed between the conveyor sections to facilitate the transfer of the article onto the pallet.

[0012] In one aspect of the invention, the extension fork assembly includes a transfer surface that remains stationary between the two conveyor sections. The transfer surface is configured to support the article as it is pushed thereacross by the pusher mechanism. In a preferred embodiment, the transfer surface is defined by a plurality of elongated beams extending between the first and second conveyor sections. In a specific embodiment, the elongated beams are integrated into the framework of the extension fork assembly. Preferably, the beams are curved and are formed of a smooth or low-friction material to facilitate sliding the article across the beams.

[0013] In an important aspect of the invention, the extension fork assembly includes a plurality of elongated forks that are initially disposed adjacent the transfer surface, or more specifically the elongated beams. A drive mechanism is provided to translate the elongated forks from their initial, or retracted, position to an

extended position in which the forks are adjacent the pallet supported on the second conveyor section.

[0014] Most preferably, the second conveyor section is oriented relative to the extension fork assembly so that the conveyor surface is below the level of the extension forks. In a most preferred embodiment, the second conveyor section is oriented so that the upper surface of a pallet situated on the conveyor is immediately beneath and in close proximity to the extended forks. The free ends of the forks can be beveled on the top and bottom faces of the forks. The beveling on the bottom face of the forks can allow the fork to ride up the side of a pallet as the forks are extended, thereby minimizing the risk that the forks will become impaled on a pallet.

[0015] The extended forks provide an additional support surface for the article to be loaded as it is pushed toward the second conveyor section. Thus, the pusher mechanism is calibrated so that its stroke is sufficient to push the article from the proximity of the first conveyor section to a position immediately above the pallet on the second conveyor section. In this position, the extended forks support the article above the pallet.

[0016] The combination of the stationary transfer surface and the support surface of the extended forks allows the article to be pushed toward the pallet without fear of the article binding along the transfer apparatus or on the pallet. This aspect of the invention renders the transfer apparatus particularly well-suited for palletizing sheet material, such as stacks of paper or cardboard

sheets. In the preferred embodiment of the invention, the support surface defined by the elongated forks is situated at or slightly below the level of the stationary support surface to ensure a smooth passage of the article onto the pallet.

[0017] In a further feature of the invention, the extension fork assembly includes a plurality of parallel forks that are interleaved between adjacent parallel elongated beams. The assembly further includes a drive mechanism for translating the forks between the retracted and extended positions. In a preferred embodiment, this drive mechanism includes a pair of parallel lead screws. Each lead screw carries a drive nut that threads along the length of the corresponding lead screw as the screw rotates.

[0018] Each drive nut is connected to a number of the elongated forks. In a preferred feature, one end of each of the elongated forks is connected to a trolley assembly that is translatably supported by a guide channel arrangement. The drive nut is then connected to the trolley assembly so that translation of the drive nut leads to translation of the trolley assembly and ultimately of the elongated forks. A single drive motor can be connected via a transmission arrangement to drive each of the lead screws so that the elongated forks are deployed evenly and in unison.

[0019] In the preferred embodiment, the free end of each of the elongated forks is supported by an idler roller assembly. Each fork is supported by its own idler roller and each roller is preferably mounted on a common shaft. Thus, each fork is supported in two

places even as the fork is moved to its extended position. In the extended position, the elongated forks are essentially cantilevered on the idler roller assembly as the forks project beyond the end of the extension fork assembly.

[0020] In accordance with the most preferred embodiment of the invention, the pusher mechanism includes an electrically controlled motor. Limit switches or sensors can be situated within the transfer apparatus to control the extent of movement of the pusher mechanism. Likewise, the drive mechanism for the extension forks can include and electrically controlled motor and limit switches or sensors to determine when the forks have reached their retracted or extended positions. The limit switches or sensors can then transmit an appropriate signal to the corresponding electrically controlled motor to activate, deactivate or reverse the motor as required for the operation of the inventive transfer apparatus.

[0021] The present invention further contemplates a method for transferring an article onto a pallet. This method is best accomplished by the inventive transfer apparatus described above. In accordance with the invention, the article to be transferred is dispensed from a first conveyor section onto a transfer apparatus. A number (most preferably a plurality) of elongated forks are extended from the transfer apparatus over the pallet situated on a second conveyor section. The article is then slid along a stationary transfer surface of the transfer apparatus.

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[0022] As the article continues to slide, is reaches the elongated forks that are at least partially extended, but preferably fully extended over the pallet. The article continues its travel along the extended forks until the article is situated directly above the pallet. The elongated forks are then retracted while the article is held in position over the pallet. When the forks are fully retracted, the article is sitting directly on the pallet and the loaded pallet is ready to be conveyed to another station by the second conveyor section.

[0023] The article is conveyed first along the stationary transfer surface and then along the elongated forks in a suitable manner. In the preferred embodiment, this manner includes a pusher mechanism that directly pushes the article from its initial position adjacent the first conveyor section to its loaded position above the pallet on the second conveyor section. Other approaches for feeding the article toward its loaded position are also contemplated, such as a gravity feed arrangement.

[0024] In the preferred embodiment, a motor-driven pusher mechanism operates in synchronization with a motor-driven extension fork assembly. In a most preferred method of the invention, the elongated forks begin their extension first, followed by activation of the motor-driven pusher mechanism. Initiation of the pusher mechanism can be accomplished by an electrical or electronic control system for the two motors, or by activation of a limit switch or sensor at a predetermined location in the initial travel of the extension fork assembly.

[0025] Once the pusher mechanism is activated, it continues to push the article toward the second conveyor section, causing the article to slide along the stationary transfer surface. The movement of the motor-driven extension fork assembly is coordinated so that the forks are fully extended over the pallet prior to arrival of the pushed article onto the support surfaces of the elongated forks. The pusher mechanism continues its operation to push the article onto the extended forks so that the forks support the article directly above the pallet. The motor-driven pusher mechanism can then be deactivated once the article reaches its loaded position.

[0026] With the pusher mechanism deactivated, the motor driving the extension forks is then reversed in accordance with one step of the inventive method. This causes the extension forks to retract away from pallet. The article is held in position by the deactivated pusher mechanism while the forks are pulled from underneath the article. When the forks have retreated to their retracted position, the article is seated directly on the pallet. Preferably, the forks have beveled tips to effect a smooth transition of the article from its support by the forks. In a most preferred embodiment, the bevel extends over a substantial length from the free tip of each fork to eliminate the risk of tipping of articles having high centers of gravity or narrow profiles.

[0027] It is one object of the invention to provide an apparatus for transferring or loading an article onto a pallet, most preferably between two conveyor sections. A further object is to achieve this

transfer without significant interruption in the process flow through the conveyor system.

[0028] One significant benefit of the present invention is that it is readily adaptable to transfer or load articles that include sheet material, such as cardboard sheets. Another benefit realized by the invention is that this transfer is accomplished without raising and/or lowering the article to be loaded or the pallet to carry the article.

[0029] Other objects and benefits of the present invention can be readily gleaned from the following written description and the accompanying figures.

DESCRIPTION OF THE FIGURES

[0030] **FIG. 1** is a top plan-view of a pallet loading conveyor system.

[0031] **FIG. 2** is a top elevational view of transfer apparatus for use with the pallet loading system depicted in **FIG. 1**.

[0032] **FIG. 3** is a side-elevational view of an extension fork assembly, forming part of the transfer apparatus illustrated in **FIG. 2**.

[0033] **FIG. 4** is a top elevational view of the drive mechanism for the extension fork assembly shown **FIG. 3**.

[0034] **FIG. 5** is an end view of the transfer apparatus illustrated in **FIG. 2** with partial cut-away showing details of the extension fork assembly.

[0035] **FIGS. 6a – 6f** are side pictorial representations of the sequence of operation of the transfer apparatus illustrated in the prior Figures.

[0036] **FIGS. 7a – 7b** are side and top elevational views of an extension fork in accordance with one embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0037] For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended. The inventions includes any alterations and further modifications in the illustrated devices and described methods and further applications of the principles of the invention which would normally occur to one skilled in the art to which the invention relates.

[0038] The present invention contemplates a system for transferring a stacked article, such as article **A** depicted in **FIG. 1**, from one conveyor to a pallet supported on another conveyor. Thus, as described above, the present invention can be used to interface between two parallel conveyor sections C_1 and C_2. A pallet **P** can be loaded onto the second conveyor C_2 by conventional means. Likewise, the article **A**, which can be of a variety of configurations, is also transferred to the first conveyor C_1 in a known manner. In the illustrated embodiment, the two conveyor paths are shown as being parallel; however, the present invention has application to a wide range of conveyor designs and arrangements. In the illustrated embodiment, the pallet **P** is held momentarily on a roller conveyor **R** directly adjacent a transfer apparatus **T** at the discharge end of the first conveyor C_1.

[0039] In accordance with a preferred embodiment of the present invention, the transfer apparatus **T** shown in **FIG. 1** can be in the form of a transfer apparatus **10** illustrated in **FIG. 2**. The transfer apparatus **10** can include a support frame **11** that can be connected to or integrated into the conveyor C_1 in a known manner. The support frame **11** permits the article **A** to be transported directly from the conveyor C_1 to an input portion **12** of the transfer apparatus **10**.

[0040] The transfer apparatus **10** can include a pusher mechanism that in the illustrated embodiment includes a pusher bar **14** propelled by a pusher drive **15**. The pusher bar and drive can be of generally any known configuration. The object of the pusher bar is to propel the article **A** from the first conveyer C_1 or from the input portion **12** onto a pallet **P** sitting on the second conveyor C_2. Again, the pusher bar **14** and drive **15** can be configured to integrate cleanly with the conveyor section C_1. For instance, in one embodiment the conveyor C_1 can be a continuous belt conveyor. The transfer apparatus **10** can include a leading roller **18** and weldment beams **20** to support the article **A** as it is propelled from the conveyor C_1 onto the transfer apparatus. The support frame can further include an array of beams or rollers to support the article at the input portion **12** of the transfer apparatus. Alternatively, the transfer apparatus can be integrated directly into a roller conveyor constructions with the support frame **11** integrated into the support frame for the roller conveyor C_1. The

pusher bar **14**, of course, is disposed above the conveyor to act directly on the article **A**.

[0041] In accordance with the present invention, the transfer apparatus **10** includes an extension fork assembly **25** that is disposed at one end of the transfer apparatus and configured to reside immediately adjacent the second conveyor C_2. The extension fork assembly **25** includes a stationary transfer surface **26** that, in the preferred embodiment, is defined by an array of parallel skid beams **27**. By stationary it is meant that the surface **26** and/or skid beams **27** are capable of supporting the article **A**, but do not translate between the input portion **12** and the second conveyor section C_2.

[0042] In accordance with one aspect of the invention, the pusher bar **14** pushes the article **A** across the skid beams **27**. In a specific embodiment, the beams are formed of stainless steel to provide a relatively smooth surface for the article **A** to slide across. Most preferably, the beams **27** have a rounded or curved upper surface **28** to minimize the frictional contact with the article **A** travelling thereacross.

[0043] In an important feature of the present invention, a plurality of extension forks **30** are interleaved between the skid beams **27**. Preferably, a greater number of beams **27** than forks **30** are provided. The number of beams and forks that are provided is dependent upon the weight of the article **A** being transferred onto the pallet. As shown **FIG. 3**, each of the extension forks **30** can terminate in a beveled tip **31**. In addition,

as depicted in **FIG. 5**, the forks can define a curved upper surface **32**. Most preferably, the forks **30** have a circular cross-section, except at the beveled tip **31**.

[0044] The extension forks are each supported by an idler roller assembly **33** that allows the forks **30** to glide smoothly along the assembly **33** and extend beyond the end of the transfer apparatus **10**. The opposite end **34** of each of the extension forks **30** is supported on a trolley guide channel beam **35** by way of a trolley assembly **38**. A drive mechanism **40** is engaged to the trolley assembly **38** to simultaneously propel each of the extension forks **30** beyond the end of the transfer apparatus **10**.

[0045] Referring to **FIGS. 3-5**, details of the extension fork assembly **25** can be discerned. In particular, the drive mechanism **40** can include a pair of lead screws **44** that are uniformly situated across the width of the transfer apparatus **10**. A drive nut **45** is engaged on each of the lead screws **44**. This drive nut is mounted to a drive plate **47**, to which the trolley assembly **38** for each of the extension forks **30** is connected.

[0046] Each of the lead screws **44** is rotationally supported within the frame **11**. The driven end of each of the lead screws **44** is coupled to a drive motor **50** by way of a transmission **49**. In the preferred embodiment, the transmission **49** can be a chain or pulley drive arrangement. A chain drive transmission **49** is most preferred between a drive gear on the motor **50** and driven gears fixed to the lead screws **44** to maintain direct and exact synchronization of rotation between the screws.

[0047] The transmission **49** ensures that rotation of the drive motor **50** produces corresponding identical rotation of each of the lead screws **44**. As the lead screws rotate, each drive nut **45** is progressively threaded down the length of the lead screws **44**. As each drive nut **45** traverses the length of the lead screws, it carries a corresponding drive plate **47** and trolley assembly **38** of the extension fork assembly **25**. As a result, rotation of the lead screw **44** leads directly to parallel translation of all of the extension forks **30** as the trolley assemblies **38** are carried along by the drive nut.

[0048] Referring now to **FIG. 5**, details of the trolley assembly **38** and guide channel beam **35** can be seen. In particular, in the preferred embodiment, the trolley assembly **38** includes a support bar **51** spanning across a plurality of forks **30**. The supported end **34** of each fork is mounted to the support bar **51** by a threaded fastener or other suitable means.

[0049] Vertical rollers **52** rotatably mounted at each end of the support bar **51** of the trolley assembly **38**. Likewise, the trolley assembly includes opposite lateral rollers **53** at the ends of the support bar **51**. The vertical rollers **52** are configured to roll within the channel **54** of the beam **35**, while the lateral rollers **53** are arranged to roll along the lower edge **55** of the beam. The combination of the vertical and lateral rollers **52, 53,** provides for stable movement of the trolley assembly **38** and the extension forks **30** mounted thereto. In addition, the combination of the vertical and lateral rollers prevents the trolley assembly **38** from binding as it rolls between opposite guide channel beams **35**.

[0050] As described above, the free ends of the extension forks **30** are supported by an idler roller assembly **33**. In the preferred embodiment, a corresponding number of idler rollers **56** are mounted on an idler shaft **57**. The idler shaft **57** rotatably supported by the frame **11** in a known manner, such as by bushings or bearings mounted within the frame and supporting the opposite ends of the shaft **57**.

[0051] Each of the idler rollers **56** preferably defines a circular groove **58** for receiving an extension fork therein. In the most preferred embodiment, each of the extension forks **30** has a circular cross-section to correspond with the circular groove **58** within the idler roller **56**. As depicted in **FIG. 3**, each of the extension forks **30** is supported at one end by the trolley assembly **38** and drive plate **47**, and at its opposite free end by the idler roller assembly **33**.

[0052] In the preferred embodiment, the upper surface **32** of each of the forks **30** is situated at or below the stationary transfer surface **26**, or more particularly below the level of the curved surface **28** of the skid beams **27**. Thus, the article **A** will not bind on the forks as it is conveyed across the transfer surface **26** to the extended forks **30**.

[0053] In a further aspect, the extension fork assembly **25** is elevated relative to the second conveyor section C_2 so that the extended forks are offset from the conveyor. More specifically, as shown in **FIG. 6a-c**, the idler roller assembly **33** supports the forks so that they sit directly above the pallet **P** when extended.

[0054] The operation of the transfer apparatus **10**, in particular, the fork extension assembly **25**, is depicted in the sequential **FIGS. 6a – 6f**. As shown in **FIG. 6a**, an article **A** is disposed on the input portion **12** of the transfer apparatus **10** adjacent the pusher bar **14**. The extension forks **30** are initially in their neutral or non-extended position. In this position, the free ends **31** of the forks **30** are supported by the idler roller assembly **33**. As also illustrated in **FIGS. 6a**, a pallet **P** has been conveyed along the conveyer C_2 so that it is immediately adjacent the discharge end of the transfer apparatus **10**.

[0055] In the next step depicted in **FIG. 6b**, the drive mechanism **40** is activated to propel the extension fork assembly **25** forward. In so doing, the beveled tip **31** of each the extension forks **30** passes over the pallet **P**. At this point, the article **A** remains at input portion **12** of the transfer apparatus.

[0056] The drive mechanism **40** continues to push the extension forks **30** over the pallet **P**, as shown in **FIG. 6c**. At some point during the stroke of the extension forks **30**, the pusher bar **14** can be activated to begin pushing the article **A** toward the pallet loading location. As shown in **FIGS. 6d**, the pusher bar **14** continues to push the article **A** across the stationary transfer surface **26** or skid beams **27** and onto the now fully extended forks **30**.

[0057] At the configuration depicted in **FIG. 6d**, the extension forks have been pushed forward to the limits of their travel so that the majority of each extension fork **30** is directly over the pallet **P**.

With this arrangement, the extension forks **30** can be supported by the pallet **P** as the weight of the article **A** bears down on the ends of the forks **30**. To facilitate sliding of the article **A** across the forks, the extension forks **30** can be formed of a smooth steel or plastic material. Both the extension forks **30** and the skid beams **27** can also include a low-friction coating, such as a TEFLON® coating, to facilitate sliding of the article **A**.

[0058] The extension fork assembly **25** can include position sensors or limit switches to determine whether the extension forks **30** have reached a limit of their travel. The position sensors or limit switches can be associated with the lead screws **44** and drive nuts **45**, or with the extension forks **30**. Tripping of position sensors or limit switches can be used to engage/activate or disengage/deactivate the drive mechanism **40**. The sensors/switches can stop or start the motor **50** or can be arranged to engage or disengage the transmission **49**.

[0059] In the preferred embodiment, limit switches are situated adjacent one lead screw at opposite ends thereof. The limit switches shut down the motor **50** and thereby stop the rotation of the lead screws **44** when the forks are at their fully retracted position, as represented in **FIG. 6a**, and at their fully extended position, as represented in **FIG. 6d**.

[0060] An additional limit switch can be disposed mid-way along the length of the lead screw **44**. This limit switch can be electrically tied to the pusher drive **15** to activate the pusher bar **14** according to the timing mentioned above. The location of the limit

switch can be determined by the rate of extension of the forks **30** and the pushing speed of the pusher bar **14**. For instance, in the preferred method, the extension forks **30** reach their full extension and are disengaged well before the pusher bar **14** has pushed the article **A** over the pallet **P**. Most preferably, the forks **30** are fully extended before the article **A** reaches the forks themselves. Thus, the additional limit switch can be situated to give the extension forks a "head start". One arrangement of limit switches is depicted in **FIG. 6c**, with switch SW_1 determining the fully retracted position of the forks, switch SW_2 establishing the fully extended position, and switch SW_3 setting the point at which the pusher mechanism is activated.

[0061] Appropriate sensors or limit switches can also detect when the pusher bar **14** has traveled to its farthest forward and rearward extent. The limit switch can be associated with the pusher bar **14** or its associated drive **15**. When the pusher limit switch determines that the pusher bar has traveled its farthest forward extent, it is known that the article **A** is positioned directly above the pallet **P**. At this point, then, the pusher limit switch can activate the extension fork drive mechanism **40** to reverse the lead screw rotation, thereby retracting each of the extension forks **30**. At this point, the pusher bar **14** remains fully extended while the extension forks are retracted, as illustrated in **FIGS. 6d-e**.

[0062] Once the extension fork assembly **25** has been fully retracted, the first limit switch SW_1 can issue a command to the pusher drive **15** to cause the drive to retract the pusher bar **14**.

The pusher bar **14** continues to retract until a pusher limit switch indicates that it has reached the opposite end of its travels. At this point, the article **A** has been safely and cleanly loaded onto the pallet **P** and the second conveyor C_2 can be activated to discharge the loaded pallet.

[0063] As shown in **FIG. 3**, the beveled tip **31** of the extension forks **30** has a relatively short extent and steep angle of bevel. In an alternative embodiment depicted in **FIGS. 7a – 7b**, a fork **60** can have a beveled tip **63** that is much more gradual. In some cases, the article **A** to be loaded onto the pallet **P** has a high center of gravity and/or narrow width. The abrupt change in height as the beveled tip **30** is withdrawn from underneath the article **A** (as illustrated in **FIG. 6e**) can be enough to topple the article **A**. Thus, with a longer more gradual bevel, such as the tip **63** shown in **FIG. 7a**, the height transition is more gradual as the extension fork **60** as removed, and the article does not tip over.

[0064] As further depicted in **FIGS. 7a – 7b**, the fork **60** includes an attachment end **61**. This attachment end preferably permits screw attachment of the extension fork **60** to the trolley assembly **38**. The attachment end **61** permits easy removal and replacement of a worn or damaged fork.

[0065] Referring back to **FIGS. 2** and **5**, it can be seen that the transfer apparatus **10** can include two adjacent transfer stations or extension fork assemblies **25** arranged side-by-side. In a preferred embodiment of the invention, two articles **A** can be conveyed onto the adjacent portions of the transfer apparatus **10**

to be loaded onto adjacently disposed pallets on the conveyor C_2. Alternatively, a single large article **A** can be transferred that spans across the entire width of the transfer apparatus **10**.

[0066] While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character. It should be understood that only the preferred embodiments have been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

[0067] For example, the transfer apparatus **10** in the illustrated includes a motor driven pusher mechanism to propel the article **A** onto the pallet **P**. Alternatively, the article **A** can be fed be gravity onto the pallet and an appropriate mechanism can be implemented to tilt the input portion **12** of the apparatus **10**. In this instance, a gate or bar could be provided in lieu of the pusher bar **14** to hold the article **A** over the pallet as the extension forks are withdrawn.

[0068] As a further alternative, the skid beams **27** forming the stationary transfer surface **26** can include rollers to further reduce the friction between the article **A** and the stationary transfer surface. In addition, the transfer surface can be powered to propel the article **A** across the surface to the waiting extended forks.